

FIG. 8 is a graph showing the characteristics of the blower according to the present invention and of the conventional blower.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention is now described with reference to FIGS. 1 and 2. FIG. 2 is a partially sectional view of the impeller taken along the line 2—2 in FIG. 1. According to the present invention, substantially ring-like openings 15b are provided at a portion where the blades 13 of the body portion 15 are mounted (in the radially extended portion 15a) and on a circumference of a circle around the shaft 6, the openings 15b extending along the direction of the arrangement of the large number of blades 13 being extended along the axial direction of the shaft 6. As shown in FIG. 1, the openings 15b are long, and provided almost all around the circumference with only four connecting portions 15c remaining.

When the blower according to the present invention with the openings 15b provided at the portion where the blades 13 of the body portion 15 are mounted (in the radially extended portion 15a) is in operation, since the blades 13 suck air from the openings 15b provided adjacent thereto, better air flowing can be obtained compared with a case where a conventional blower with no such openings (see FIGS. 4 and 5).

Tables shown in FIGS. 6 and 7 are with respect to the blower according to the present invention and the conventional blower, respectively. The tables show changes in the pressure and the speed with the flowing rate of air as the parameter. The tables show that, with the blower according to the present invention, as the flow rate decreases, the pressure rises more steeply and the speed rises more gently compared with the case where the conventional blower is used. FIG. 8 plots the data shown in FIGS. 6 and 7. In FIG. 8, type A denotes the conventional blower while type B denotes the blower according to the present invention. The data was collected from actually manufactured blowers. It can be seen that, the flow rate when, for example, the static pressure is 150 Pa is, 0.328 m³/min with regard to the conventional blower and 0.419 m³/min with regard to the blower according to the present invention, which clearly shows the improvement attained by the present invention.

A blower according to the first aspect of the present invention has a simple structure only with the openings provided at a portion where the blades of the body portion are attached, and thus, the P-Q characteristics can be improved without making the blower larger. Further, a blower according to the second aspect of the present invention defining the position and the shape of the openings can enhance the above effect.

What is claimed is:

1. A blower comprising

—a shaft which is supported rotatably in a tubular casing,

—a cup shaped motor yoke fixed to said shaft, wherein the shaft extends from a closed end of the cup shaped motor yoke to an open end of the cup shaped motor yoke, and

—a body portion of an impeller comprising a plurality of blades on an outer peripheral portion fixed to said motor yoke, wherein [substantially ring-like] openings are provided in the body portion at a mounting portion

where said plurality of blades are mounted and on a circumference of a circle around said shaft, and wherein the mounting portion is located substantially adjacent, in a radially outward direction, the open end of the cup shaped motor yoke.

2. A blower according to claim 1, wherein said openings substantially form a long opening in an arc extending along the direction of the arrangement of said plurality of blades.

3. A blower according to claim 1, wherein the openings in the mounting portion are substantially annular.

4. A blower comprising

—a casing comprising a first portion having a circular space that accommodates a body portion of the blower therein and a second portion that joins to the first portion and includes an air inlet opening therein, wherein the casing further includes an outlet for air discharge;

—the body portion comprising an impeller and having a cup shaped hub with a closed end and an open end, a plurality of blades peripherally surrounding the cup shaped hub being supported on a blades-mounting portion of the body portion; and

—a driving motor,

wherein the body portion is rotated by the driving motor,

wherein the blades-mounting portion lies substantially adjacent, outwardly in a radial direction, the open end of the cup shaped hub, and

wherein the blades-mounting portion includes openings therein.

5. A blower according to claim 4, further including a motor yoke fixed inside the cup shaped hub of the body portion.

6. A blower according to claim 4, wherein the first portion of the casing includes no air inlets therein such that the air inlet in the second portion of the casing is the only air inlet for the blower.

7. A blower according to claim 4, wherein the openings in the blades-mounting portion are substantially annular.

8. A blower according to claim 4, wherein the outlet for air discharge in the casing comprises an opening in a side of the casing radial to the plurality of blades.

9. A blower comprising

—a casing comprising a first portion having a circular space that accommodates a body portion of the blower therein and a second portion that joins to the first portion and includes an air inlet opening therein, wherein the casing further includes an outlet for air discharge;

—the body portion comprising an impeller and having a cup shaped hub with a closed end and an open end, a plurality of blades peripherally surrounding the cup shaped hub being supported on a blades-mounting portion of the body portion; and

—a driving motor,

wherein the body portion is rotated by the driving motor,

wherein the blades-mounting portion is located at a side of the casing adjacent a bottom of the circular space of the first portion, and opposite the second portion, and

wherein the blades-mounting portion includes openings therein.

10. A blower according to claim 9, further including a motor yoke fixed inside the cup shaped hub of the body portion.

11. A blower according to claim 9, wherein the first portion of the casing includes no air inlets therein such that the air inlet in the second portion of the casing is the only air inlet for the blower.

12. A blower according to claim 9, wherein the openings in the blades-mounting portion are substantially annular.

13. A blower according to claim 9, wherein the outlet for air discharge in the casing comprises an opening in a side of the casing radial to the plurality of blades.

14. A blower comprising

a casing comprising a first portion having a circular space that accommodates a body portion of the blower therein and a second portion that joins to the first portion and includes an air inlet opening therein, wherein the casing further includes an outlet for air discharge;

the body portion comprising an impeller and having a cup shaped hub with a closed end and an open end, a plurality of blades peripherally surrounding the cup shaped hub being supported on a blades-mounting portion of the body portion; and

a driving motor,

wherein the body portion is rotated by the driving motor,

wherein the first portion of the casing further includes a base having a protruding cylindrical portion that accommodates a bearing tube,

wherein the blades-mounting portion is substantially adjacent, outwardly in a radial direction, the protruding cylindrical portion, and

wherein the blades-mounting portion includes openings therein.

15. A blower according to claim 14, further including a motor yoke fixed inside the cup shaped hub of the body portion.

16. A blower according to claim 14, wherein the first portion of the casing includes no air inlets therein such that the air inlet in the second portion of the casing is the only air inlet for the blower.

17. A blower according to claim 14, wherein the openings in the blades-mounting portion are substantially annular.

18. A blower according to claim 14, wherein the outlet for air discharge in the casing comprises an opening in a side of the casing radial to the plurality of blades.

19. A blower comprising

a casing comprising a first portion having a circular space that accommodates a body portion of the blower therein and a second portion that joins to the first portion and includes an air inlet opening therein, wherein the casing further includes an outlet for air discharge;

the body portion comprising an impeller and having a cup shaped hub with a closed end and an open end, a plurality of blades peripherally surrounding the cup shaped hub being supported on a blades-mounting portion of the body portion; and

a driving motor,

wherein the body portion is rotated by the driving motor,

wherein the blades-mounting portion includes openings therein, and

wherein the first portion of the casing includes no air inlets therein such that the air inlet in the second portion of the casing is the only air inlet for the blower.

20. A blower according to claim 19, wherein the outlet for air discharge in the casing comprises an opening in a side of the casing radial to the plurality of blades.

21. A blower comprising

a casing comprising a first portion having a circular space that accommodates a body portion of the blower therein and a second portion that joins to the first portion and includes an air inlet opening therein, wherein the casing further includes an outlet for air discharge;

the body portion comprising an impeller and having a cup shaped hub with a closed end and an open end, a plurality of blades peripherally surrounding the cup shaped hub being supported on a blades-mounting portion of the body portion, wherein the blades-mounting portion includes openings therein; and

a driving motor,

wherein the body portion is rotated by the driving motor, and

wherein the air inlet opening in the second portion of the casing and the closed end of the cup shaped hub together form a continuous annular air inlet passageway.

22. A blower according to claim 21, wherein the outlet for air discharge in the casing comprises an opening in a side of the casing radial to the plurality of blades.
